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UNITED STATES DEPARTMENT OF AGRICULTURE  
Bureau of Entomology and Plant Quarantine



OUTLINE OF PLAN OF OPERATION FOR INVESTIGATIONS CARRIED ON BY THE BUREAU  
OF ENTOMOLOGY AND PLANT QUARANTINE WITH ALLOTMENT FROM THE  
PUERTO RICO PROCESSING TAX FUND

General Information

Puerto Rico Tax Fund Order No. 2, approved April 5, 1935, makes available the sum of \$93,000 or as much thereof as the Bureau may require for a study and investigation of insect pests of Puerto Rico.

It is planned to conclude the investigations conducted under this allotment by June 30, 1936. It is proposed to treat this allotment as a single financial project which will be under the general direction of the Chief of Bureau, the amounts devoted to various activities being treated as work projects.

Business Operations

Effective coordination of the work on the island will be accomplished by establishing a central office under the direction of an individual directly responsible to the Chief of the Bureau for fiscal and business operations and maintaining effective relations with the Experiment Station under the direction of the Office of Experiment Stations, the Insular Experiment Station, corporations, organizations and individuals. This individual will be responsible for the cooperative relations and agreements. He will also be responsible for business relations including:

- 1) Purchasing of supplies and equipment
- 2) Preparation of payrolls and general vouchers
- 3) Review of expense accounts of expenditures by various workers
- 4) Employment under letter of authorization of accessory help needed in connection with the various problems within the limits of the amounts allocated for such work
- 5) Inventory and preservation of equipment and property secured for work under the processing tax fund
- 6) Effective use of equipment secured for work under these funds which may involve temporary assignment to various investigators.

Plan of Employment

Individuals selected to carry out these investigations will, in so far as practical, have Civil Service status. Consideration will be given to the reinstatement of men who have had previous service in the Bureau or Department and whose training and experience qualify them for such an assignment.



In so far as practical, the basic salary paid for work carried on under this assignment will be comparable for similar work on the mainland. Due consideration will, however, be given to the temporary nature of the employment and location of assignment. Should a somewhat higher compensation be paid it is to be definitely understood that an appropriate adjustment will be made in event the individual is later given an assignment for comparable work on return to the mainland. Individuals selected will report to Puerto Rico at their own expense. Should it be necessary to require them to report to Washington for instructions and conference those so instructed will be paid salary during the period of their assignment in Washington and allowed a per diem of \$5.00 per day. Should individuals instructed to stop in Washington necessarily incur additional expense in travel, via Washington, from place of appointment to Puerto Rico, administrative approval will be given to their claim for reimbursement of such additional expense as may be authorized under the standard travel regulations.

#### Technical Direction

The technical direction of various problems to be studied under the processing tax fund will rest with the Division to which such problems are assigned. To assure full understanding regarding problems studied and for effective coordination and operation, the Divisions concerned with the technical direction of any activity will forward to the Chief of Bureau and his representative in Puerto Rico carbons of all letters they may send to investigators assigned to problems coming under their general direction.

#### Divisions Concerned and Problems to be Studied

The order allocating funds for the work in Puerto Rico is in general terms and is legally available for the study and investigation of any insect pests.

The recommendation to the Secretary regarding work in Puerto Rico mentioned specific problems and indicated the amounts estimated as necessary for such work. The initial allotments to various lines of work will provide for the lines discussed in the memorandum to the Secretary. As the work progresses it may be advisable to make adjustments in the allotments and provide for work on new problems or placing additional emphasis on some that may be under way. The following outline as to work and allotments is initial and tentative, subject to adjustments:





### Foreign Parasite Introduction

The Division of Foreign Parasite Introduction will be responsible for directing the work incident to exploration for natural enemies of insect pests that may be introduced and collection and importation in connection with such exploration. This Division will also be responsible for the technical direction of all the work of colonizing these enemies in Puerto Rico and for handling cooperative relations with other divisions which may supply parasites for colonization in Puerto Rico.

The activities to be given principal consideration are: (a) parasites of sugar cane insects, particularly the sugar cane moth borer; (b) parasites of the pink boll worm; and (c) parasites of fruit flies.

The work on parasites of sugar cane insects will require travel in certain West Indian Islands and in South America. The collections made in connection with these travels will largely determine the colonization work that may follow.

In the work on parasites of the pink bollworm, the initial plans provide for the following. Recently we have imported into the United States parasites of the pink bollworm and it is planned to make further efforts in this direction. Through the cooperation of the Division and laboratory concerned, it is proposed to rear additional specimens of these parasites and forward them to Puerto Rico for colonization. Certain parasites of the pink bollworm are also known to occur in Hawaii and may be collected by employing additional labor working under the direction of the men now stationed there. Such arrangements would be carried on in cooperation with the Honolulu laboratory.

Specific parasites of the two species of fruit flies occurring in Puerto Rico are not known. It seems likely, however, that parasites of the Mediterranean fruit fly as well as parasites of the Mexican fruit fly may also attack fruit flies known to occur in Puerto Rico. Consideration will be given to importing parasites from Mexico and Hawaii through the cooperation of laboratories in these localities. The expense for labor and collection being paid from the processing tax funds. Consideration will also be given to importing a parasite of fruit flies recorded from Brazil.

In the course of these studies and particularly in the exploration work it may be practical, with only incidental expense to secure natural enemies of other pests common to Puerto Rico. If so an effort will be made to import and colonize these. Should it be determined that there are parasites of insect pests common to Puerto Rico and the mainland or should such parasites be established as the result of this work, colonies may be assembled in Puerto Rico for forwarding to the mainland. Should natural enemies of insect pests of Puerto Rico and the mainland be located in the exploratory work colonies of such parasites may be forwarded to the mainland as well as to Puerto Rico when they can be assembled and prepared with only incidental expense.





In event shipments are made to the mainland, appropriate adjustments should be made regarding additional expense involved taking into full consideration the aid rendered by laboratories maintained with regular funds in importing natural enemies into Puerto Rico.

#### Fruit Insects.

The work on insects attacking fruit will be under the technical direction of the Division of Fruit Insects. The activities to be given initial consideration are: (1) Insects attacking coffee; (2) insects attacking coconut; and (3) fruit flies and their control in Puerto Rico.

##### (1) Insects attacking coffee.

In the work on insects attacking coffee special attention will be directed to the relation between ants and various coffee pests such as scales, plant lice and mealybugs with the hope of developing information which will make it possible to break the association between these insects and thus effect control.

##### (2) Insects attacking Coconut.

In studying the insects attacking coconut, special attention will be directed to a determination of the relation the rhinoceros beetle and various palm weevils have to diseases of coconut. If practical it is planned to demonstrate the effect sanitation or similar cultural practices have on the control of the rhinoceros beetle.

##### (3) Fruit flies and their control.

In the studies on fruit flies, attention will be directed to the development of measures other than the use of natural enemies which may have a bearing on the control of these pests in Puerto Rico. These activities will be closely correlated with work being done with regular funds which has as its principal object the securing of information useful in eradication. Special attention will be given to testing methods of treating fruits to determine the effectiveness of such measures in killing all immature stages of the fruit flies.

#### Truck Crop Insects.

The technical direction of work on insects attacking truck crops, etc. will rest with the Division of Truck and Garden Crop Insects. Initially attention will be directed to insects attacking beans and the mole cricket which attacks



a variety of crops but is of particular importance in seed beds.

The more important insect pests of beans appear to be the various pod borers some of which are not known to occur in the mainland. An effort will be made to determine the life history, habits and relative importance of these and to test methods of control, particularly those which from work on similar pests on the mainland appear to be promising. Other pests of beans and related lines of work will be given such attention as is practical.

In the work on mole cricket attention will be given to testing various control measures, particularly baits, tried on the mainland, as well as such other measures as may be suggested. It will include work on the habits and such other lines of work on this pest as may appear desirable on any crops it may injure, such as grasses, etc.

As the work progresses attention may be directed to other pests of truck crops and if practical suggested recommendations for control tested or demonstrated. It may be desirable to give attention to the weevils attacking sweet potatoes and even carry on some small tests to demonstrate, to interested growers, the benefits of adopting the control used on the mainland.

At the start, the insect pests of tobacco will be given only incidental attention but an effort will be made to obtain information on their importance.

#### Cotton Insects.

The work on cotton insects will be under the technical direction of the Division of Cotton Insects. Particular attention will be given to determining the status of the pink bollworm especially its possible occurrence on plants other than cotton. The effort to reduce the abundance of the pink bollworm by the elimination of cultivated and wild cotton will be studied and if practicable cooperation extended to local agencies as advice and other technical assistance. The possibility of this insect carrying over in other plants, wild or cultivated, in numbers sufficient to permit a rapid build-up of population in event cotton was planted commercially will be given particular attention.

An effort will be made to secure information on the habits, abundance and life cycle of any other insects attacking cotton. The possibility of such cotton insects as the flower bed maggot, Contarinia gossypii, and the blister mite, Eriophyes gossypii, having other hosts will be studied. Observations should also be made on such pests as the cotton leaf worms, and the bollworm. In the case of the latter pest, however, the activities should be cooperative with others who may consider this pest on other crops.





### Cereal and Forage Insects.

The technical direction of studies on insects attacking sugar cane and cereal or forage crops, excepting work on the mole crickets, will rest with the Division of Cereal and Forage Insects. Particular attention will be given to insects and their relation to production of sugar cane. The relation of insects to the transmission of various diseases of sugar cane will be restudied in light of information recently secured in Louisiana. The comparative resistance or tolerance, of various varieties of cane to injury and attack by the sugar cane moth borer will be given attention. These activities, and particularly the latter, will be coordinated with work on sugar cane now under way in the Federal Experiment Station.

While special emphasis will be placed on insects attacking sugar cane, observations will also be made on other pests of cereal and forage crops, particularly the corn ear worm.

### Insects Affecting Man and Animals.

The activities concerned with insects affecting man and animals will be under the technical direction of the Division of Insects Affecting Man and Animals. Problems receiving initial attention are: (1) Mosquitoes; and (2) Certain insects attacking cattle.

#### (1) Mosquitoes.

Special attention will be given to mosquitoes and their relation to agricultural conditions. It is understood that recent adjustments in farming conditions have led to the establishment of irrigation projects in various parts of the island which appear to have produced situations favorable for breeding mosquitoes in large numbers. A survey will be conducted to secure information regarding these conditions and, where practical, methods of correction will be presented to the appropriate agencies concerned with these operations. An effort will be made to determine the effect mosquitoes may have on the transmission of certain diseases, particularly those associated with malaria, encephalomyelitis of horses and fowl pox of poultry. A study will be made of the seasonal occurrence, distribution and habits of the mosquitoes of the island and particularly those which are responsible for the transmission of various diseases. In connection with the observations on mosquitoes, incidental attention may also be given to sand flies to determine the forms concerned, their biology and ways of control.

#### (2) Insects affecting Cattle.

A study will be made of insects attacking cattle with special reference to the horn fly and screw worms. In these studies



an effort will be made to determine their habits and applicability of known control measures to conditions in Puerto Rico. This will include observations on the relation of natural enemies. It is reported that in some localities natural enemies have aided in the control of certain insects attacking cattle. Should such natural enemies be absent from Puerto Rico and it seem practical consideration will be given to their importation, such work being under the direction of the Division of Foreign Parasite Introduction.

#### General Observations.

It is desired that the various projects undertaken be given first consideration in order that the information and results secured can be of the greatest benefit possible in the short time available. It is anticipated, however, that the various investigators will make and record such additional observations as practicable without detriment to their main assignment.

Termites are important pests in Puerto Rico and recorded as doing serious damage to wooden structures and furniture on that island. Observations on the destructiveness and occurrence of the species concerned may well be recorded. Notes on any of the tropical woods resistant to attack by these or other insects would be useful and may aid in selecting species of trees valuable in connection with reforestation work on the island.





INITIAL ALLOTMENTS TO VARIOUS ACTIVITIES

General Administration and Business Operations.....	\$15,900
Introduction and Colonization of Natural Enemies.....	13,900
Fruit Insects	
Insects attacking coffee.....	\$5,600
Insects attacking coconut.....	6,100
Fruit flies and their control....	<u>2,200</u>
	13,900
Truck Crop Insects	
Insects attacking beans.....	\$4,000
Mole crickets.....	<u>4,800</u>
	8,800
Cotton Insects.....	4,800
Cereal and Forage Insects	
Insects attacking Sugar Cane....	\$12,100
Insects attacking Corn.....	<u>3,800</u>
	15,900
Insects Affecting Man and Animals	
Mosquitoes.....	\$ 5,400
Insects Attacking Animals.....	<u>4,100</u>
	9,500
Unallotted.....	<u>10,300</u>
TOTAL.....	\$ 93,000

Approved, June 11, 1935.

Lee A. Strong (s)  
Chief of Bureau.

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Entomology and Plant Quarantine, Bureau of.

Outline of plan of operation for investigation carried on ~~tax~~ by the Bureau of Entomology and Plant Quarantine with allotment from the Puerto Rico processing tax fund.

Approved, Lee A. Strong. June 11, 1935.

# U. S. DEPARTMENT OF AGRICULTURE

## BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

ORGANIZATION OF WORK UNDER  
 PUERTO RICO PROCESSING TAX FUND  
 FISCAL YEARS 1935 AND 1936



